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ESSENTIALS FOR THE SUCCESSFUL OPERATION OF A LOCAL CREAMERY

By

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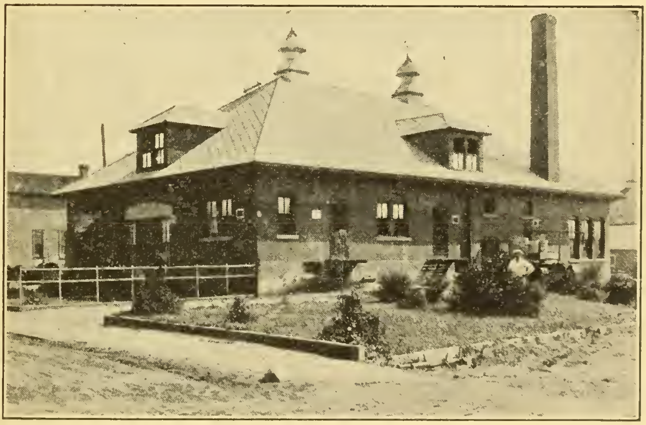

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In considering the establishment of a local creamery such questions as the following naturally come up: "Do conditions warrant establishing a creamery in the community?" and "What are the problems involved in such a venture?" It is to assist in answering these and similar questions that this publication has been prepared.

VOLUME OF CREAM AFFECTS COST OF MANUFACTURING BUTTER

One of the first matters to be considered is, "What is the minimum volume of cream required for the successful operation of a creamery?" This question can not be answered with a definite figure, though a considerable volume is necessary if the operating expense per pound of butter is to be kept reasonably low. Under normal conditions the larger the volume of product handled, within certain limits, the less will be the manufacturing expense per pound. For example, a creamery manufacturing 500,000 pounds of butter a year usually operates at a smaller expense per pound than one making only 100,000 pounds a year.

Table 1[1] shows the range in operating expense per pound of butter at a number of Minnesota creameries, grouped according to the annual output of butter. This range was from 8.1 cents to 2.4 cents per pound. It seems quite evident that a creamery with an expense of 8.1 cents a pound would be greatly handicapped in competing with one having an expense of only 2.4 cents a pound.

The average operating expense for the group making less than 100,000 pounds of butter a year was 5.75 cents per pound, whereas that for the group making from 200,000 to 250,000 pounds was approximately 4 cents, or 1.75 cents less per pound. At the creameries making more than 250,000 pounds the expense decreased still further but not so rapidly.

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[1] Black, J. D., and Guthrie, E. S. ECONOMIC ASPECTS OF CREAMERY ORGANIZATION. Minn. Agr. Expt. Sta. Tech. Bul. 26, 111 p., illus. 1924.

TABLE 1.—*Manufacturing costs at Minnesota creameries grouped according to output of butter*[1]

Output groups with production of—	Costs per pound of butter		
	High	Low	Average
	Cents	*Cents*	*Cents*
Under 100,000 pounds	8. 1	4. 6	5. 75
100,000 to 150,000 pounds	6. 6	3. 7	5. 05
150,000 to 200,000 pounds	5. 2	3. 5	4. 31
200,000 to 250,000 pounds	4. 6	3. 3	4. 05
250,000 to 300,000 pounds	4. 1	3. 3	3. 77
300,000 to 400,000 pounds	3. 7	2. 8	3. 55
400,000 to 500,000 pounds	3. 4	2. 6	3. 20
Over 500,000 pounds	3. 1	2. 4	2. 98
All groups	8. 1	2. 4	4. 07

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[1] At these creameries a very large percentage of the butter is packed in 63-pound tubs and shipped to wholesale dealers in distant markets. The manufacturing expense does not include transportation to market. There is no material selling expense such as that involved in jobbing the butter. As the butter is not printed these figures do not include expense of that operation. These points should be considered when estimating probable cost of operating a creamery under other conditions.

It is sometimes contended that in sections where dairying is in its infancy it is necessary to build a creamery and thus provide a market for cream in order to induce the farmer to buy dairy cows. Some plants have been started on this basis and have been successful, but the likelihood for failure is much greater than for success because, with a very small output, the unit cost of operation is very high; consequently the price that the creamery can pay for butterfat is likely to be so low that it will tend to discourage rather than encourage dairying. If, on the other hand, the creamery pays a relatively high price for butterfat regardless of operating expense, unless it is being subsidized, it may soon be hopelessly in debt.

A creamery, however, can sometimes be started in connection with another business and be operated successfully on a smaller scale than when it is wholly an independent business. In this way it is possible to practice many economies in overhead expense, labor, and sometimes in heat and refrigeration.

A few creameries have been able to operate successfully with a very small output by developing special outlets for their butter at prices high enough to counterbalance their high operating expenses.

SUFFICIENT NUMBER OF COWS IS NEEDED

It is difficult for the layman to estimate the volume of cream available or the probable output of a plant, and he therefore asks, " How many cows are needed? " If a plant is to make about 200,000 pounds of butter a year, at least 160,000 pounds of butterfat are needed. The average annual production of butterfat per cow for the entire United States is estimated to be 180 pounds. Nearly 900 cows of average production, therefore, would be required to produce 160,000 pounds of butterfat in a year. The production per cow varies greatly, and it is advisable, if possible, to get an estimate for the cows in the community. The county agricultural agent or the dairy department of the State college may be able to furnish data on this point.

In making a survey to determine the number of cows in the community it must be remembered that the product of all these cows will not be available for the creamery. Allowance should be made for the cows needed to supply the farm homes, and family cows and those producing milk for the town should be excluded.

TERRITORY FOR GATHERING CREAM SHOULD BE LIMITED

The next question that usually arises is: "If about 900 cows are needed, in how small an area should they be situated?" or "From how large a territory may cream be gathered?"

Usually a local creamery obtains cream from the territory of which the town is the trading center, also from sections that may easily be reached by truck, and possibly from sections from which cream may be shipped readily by rail or other public carriers.

In a survey[2] of 88 local creameries in Minnesota, 81 were found to be operating in areas of 150 square miles or less, a territory equivalent to that within a radius of 7 miles of the creamery. Six plants were operating in areas averaging 416 square miles, a territory equivalent to that within 12 miles of the creamery. The annual output of butter by creameries in these two groups averaged 200,000 and 227,000 pounds, respectively. In sections where dairying is not practiced so intensively, creameries are usually more widely separated and receive cream from greater distances.

The factors limiting the territory from which cream may be obtained by a creamery are mainly the following: The condition of roads in the community, the cost of transportation, and the extent of injury to the quality of cream while in transit.

The extent of road improvement has an important bearing on the transportation of cream. Good roads enable a creamery to serve a large territory at low transportation costs. When farmers are delivering their own cream good roads encourage frequent and regular deliveries, which are important factors in making high-quality butter.

When a farmer delivers his own cream to a near-by creamery and does his trading or attends to other business on the same trip the cost of transporting the cream is small. When trips are made exclusively for carrying cream, changing off with a few neighbors who also have cream to send provides a means of keeping transportation costs low. If a cream-gathering route is to be operated the cost of hauling per pound of butterfat will be low only when a large volume is obtained from a relatively small territory. For example, if a man and truck are hired to gather cream from farmers in a certain territory for $10 per trip and only 100 pounds of butterfat are collected the cost of hauling will be 10 cents a pound which, of course, is prohibitive. If, however, the dairies are large and close together the hauler may obtain 1,000 pounds of butterfat per trip, in which case the cost per pound is only 1 cent, which is considered very low even in sections where dairying is practiced intensively.

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[2] BLACK, J. D., and GUTHRIE, E. S. Op. cit.

Cream that is in transit a day or more in hot weather without adequate protection from the heat deteriorates materially during that time. To make the highest quality butter, deterioration of cream in transit must be avoided. This may be done by restricting the territory.

FACTORS INFLUENCING THE PRICE THAT A CREAMERY CAN PAY FOR BUTTERFAT

The selling of butter at wholesale on a few large markets establishes the current market price, which is the basis on which practically all creameries sell their butter. The price that a creamery can pay for butterfat, therefore, depends in part upon the market price of butter. This price varies from day to day, but there is a seasonal trend, due to the relation between supply and demand. During the late spring and summer production is at its maximum, and more butter is produced than is consumed. The price is naturally lower at that time than in the late fall and winter, when production is less than consumption. Table 2 shows the seasonal variation in price of butter in New York City during the year 1927.

The price that a creamery can pay for butterfat in relation to the market price of butter depends mainly upon (1) the quality of butter manufactured, (2) merchandising methods, (3) the cost of manufacture, and (4) the degree of efficiency in the management and operation of the creamery.

Butter on the wholesale markets is graded closely and sold according to the prevailing price for that grade. The difference between the prices of high-grade and low-grade butter is sometimes as much as 11 cents a pound. Table 2 shows the average prices by months for butter of high grade (92 score) and low grade (87 score) on the New York City market.

Table 2.—*Average monthly prices for 92-score and 87-score butter on New York City market in 1927*

Month	92 score	87 score	Difference	Month	92 score	87 score	Difference
	Cents	*Cents*	*Cents*		*Cents*	*Cents*	*Cents*
January	49.15	44.68	4.47	July	41.72	37.46	4.26
February	51.54	48.45	3.09	August	41.88	38.19	3.69
March	50.17	48.00	2.17	September	46.46	39.80	6.66
April	50.34	46.18	4.16	October	48.39	41.10	7.29
May	43.46	38.24	5.22	November	49.79	41.00	8.79
June	42.51	37.23	5.28	December	51.87	41.08	10.79

Table 2 indicates that a creamery making high-quality butter normally receives a higher price for its product than a plant making low-quality butter.

The layman may consider that the only factors essential to the manufacture of high-quality butter are a well-equipped creamery and an expert buttermaker. Although both of these are important, another essential factor is high-quality cream. The term "quality" in this connection means sweetness and cleanness of flavor. The most skillful buttermaker in the best equipped creamery can make the highest quality butter only when supplied with high-quality cream.

In planning the establishment of a creamery with the expectation of making only high-quality butter the requirement that cream be delivered fresh and sweet is an essential part of the plan of operation. Consideration must be given to whether or not this is practicable under conditions existing in the community. The cooperation of the producers in this plan is essential. If the majority of producers are whole-heartedly in favor of it, it is not difficult for the creamery manager to enforce regulations governing this matter.

The question naturally comes up as to what should be done with cream that does not meet the requirements. At some plants only sweet and clean-flavored cream is accepted. At others cream is graded according to the quality of butter that can be made from it, and a price for each grade of cream is fixed accordingly. It is only fair that cream should be graded and the price per pound butterfat determined according to its market value just as wheat, cotton, and other produce are graded and paid for according to their market value.

In order that the cream may be sweet when it is delivered at the creamery it must be produced under sanitary conditions, cooled and cared for properly on the farm, and delivered at the creamery two to four times a week, depending largely upon the temperature at which it is held on the farm.

The net price received for butter in relation to the market price is influenced by merchandising methods. The highest price may usually be obtained only by devoting considerable time and thought to the marketing of the butter.

When butter is marketed in retail packages the price obtained for it may be a small or large amount above the wholesale price for that grade, depending upon the kind of trade to which the butter is sold and the development of a demand for that particular brand of butter.

The managers of small creameries occasionally act as their own jobbers and thereby obtain higher prices for the butter and maintain control of the distribution. It is possible that their time may be employed more profitably in this way than in doing routine work in the creamery. Some small plants owe their success to the selling of their butter direct to retail grocers, hotels, restaurants, and similar trade. If a uniformly high-quality product is being made, there is opportunity to establish a demand for the butter among those who are willing to pay more for this type of product. The financial standing of all prospective customers, however, should be determined before accounts are opened with them.

Seasonal variation in butter output, however, makes this method of selling difficult. Although the quantity of butter manufactured in June is usually twice that manufactured in November, the consumer uses about the same quantity each month in the year. Consequently, in the spring and summer the creamery has a surplus to dispose of in some other way. This may be shipped to a large wholesale market. Some plants store their surplus butter and use it to supply their trade during the fall and winter when their output is insufficient for the demand.

The cost of manufacture naturally has a direct bearing on the price that a creamery can pay for butterfat. This cost is influenced by the output of the plant, as discussed previously, and by the efficiency of operation.

One point in the operation of a creamery which seems worthy of special note is the yield of butter per pound of butterfat purchased. The quantity of butter obtained is normally somewhat greater than the quantity of butterfat in the cream because, in addition to the butterfat, butter contains salt, water, and curd. A typical analysis of butter is as follows: Butterfat, 80.7 per cent; water, 15.5 per cent; salt, 2.8 per cent; and curd, 1 per cent. In an efficiently operated creamery approximately 1.23 pounds of butter is obtained from each pound of butterfat purchased. The increase in quantity of butter over butterfat, which in this case amounts to approximately 23 per cent, is known as overrun. The amount of overrun obtained depends upon the operator. If an abnormally large quantity of butterfat remains in the buttermilk or is lost in some other way, such as in spilled cream, or if the percentage of butterfat in the butter is abnormally high the overrun may be reduced materially; that is, the creamery may have considerably less than 1.23 pounds of butter from each pound of butterfat. It is apparent that this would reduce the creamery's income and consequently reduce the price that the creamery could pay for the butterfat.

The question is frequently asked, "What price can a creamery pay for butterfat, in relation to the price received for butter?" In the case of a creamery that determines the price to be paid for butterfat each month by deducting the operating expenses (including the pro rata portion of all annual expenses such as taxes and depreciation) from the gross receipts and dividing this figure by the number of pounds of butterfat received, this price would be somewhat higher than the price received for the butter. For example, from 1 pound of butterfat 1.23 pounds of butter is obtained, which, if butter is sold at 40 cents a pound, brings a return of 49.2 cents. If the operating expense is 4 cents per pound, the expense for 1.23 pounds would be 4.9 cents. Deducting this from 49.2 cents leaves 44.3 cents, the price that could be paid per pound butterfat. In this case the creamery could pay 4.3 cents more per pound for butterfat than was received per pound for butter.

EFFICIENT BUSINESS MANAGEMENT IS ESSENTIAL

A commercial creamery is a business enterprise that requires just as efficient management as any other commercial organization of similar size.

In a well-managed creamery an accurate account is kept of the finances and of all materials handled in and out of the factory, the plant is arranged and equipped so that it may be operated efficiently, the most skilled methods of manufacture are used, all deliveries of cream are carefully inspected, and the finished product is marketed in such a manner as to bring the creamery the largest net amount.

As in any other business, the highest degree of success is attained when a creamery is managed by a man who has had proper training and experience and who has some natural managerial ability.

SKILLED OPERATOR SHOULD BE EMPLOYED

The commercial manufacture of butter can be carried on properly only by a man who has been well trained in the business and has become a skillful operator. Such a man naturally commands a good salary, but inefficiency in a creamery so quickly involves big losses that an efficient man is essential to a successful business. Carelessness in the creamery may result in a poor quality of butter which may sell for 2 cents a pound less than butter of good quality. Under such circumstances a creamery making 200,000 pounds of butter a year would lose $4,000. Failure to obtain the proper yield of butter from the butterfat purchased may easily result in a loss of 5 per cent of the output. On 200,000 pounds of butter this loss would be 10,000 pounds of butter which, valued at 40 cents a pound, also amounts to $4,000 a year.

A Federal law requires all butter shipped in interstate commerce to contain at least 80 per cent butterfat. Failure to comply with this law, through carelessness or ignorance of manufacturing methods, may cost the creamery a heavy penalty. On the other hand, the creamery can not afford to go to the other extreme and put out butter containing as much as 85 per cent butterfat. An excess of 4 per cent butterfat in the butter for a creamery making 200,000 pounds of butter a year would cause a loss of $3,000 to $4,000.

CLEANLINESS IS IMPORTANT

Cleanliness in a creamery is practiced not merely for æsthetic reasons nor to win the good will of the public. It is essential in producing a high-quality product and one that will maintain its high quality until consumed. Fine butter can not be made unless the interior of churns, pasteurizers, pumps, pipes, and similar equipment are kept perfectly clean. As for the exterior of the equipment, the floor, walls, and windows, modern standards demand that these be kept clean; for butter, like all other food products, must be manufactured in sanitary factories where a high degree of cleanliness is maintained throughout.

All persons engaged in making or handling butter should wear clean, white suits. (Fig. 1.) Butter should be handled with wooden paddles rather than with the bare hands.

The plant, the equipment, the personnel, and the practices should be on such a high plane of cleanliness that visitors may go through the plant at any time and be impressed favorably with all that they see.

A GOOD LOCATION SHOULD BE SELECTED

A creamery, being a business enterprise, is usually located in a village, town, or city. It should be conveniently situated for the farmers to deliver cream, if delivery of cream by the farmers themselves is contemplated. If it is to be situated in a good-sized town, the possibilities of carrying on a retail trade should be given consideration and a location chosen accordingly.

The modern creamery, properly operated, is a sanitary food factory, and it may therefore occupy a prominent location in the business section of the town. (Fig. 2.) It should, however, be exposed on all four sides to afford proper light and ventilation.

A CREAMERY NEEDS A GOOD DRAINAGE SYSTEM

Large quantities of water are used in creameries for cooling cream and for cleaning purposes. The waste from the plant should run into the city sewerage system, or if the plant is not located in a town so equipped, a sewage disposal plant should be provided.

A WELL-PLANNED BUILDING INCREASES EFFICIENCY

The building may be of frame, brick, stone, tile, or other material. It should be planned to accommodate the equipment that is to be placed in it. (Fig. 3.) The planning of the building, as well as the selection and placing of equipment, therefore, should be done by an experienced creamery man.

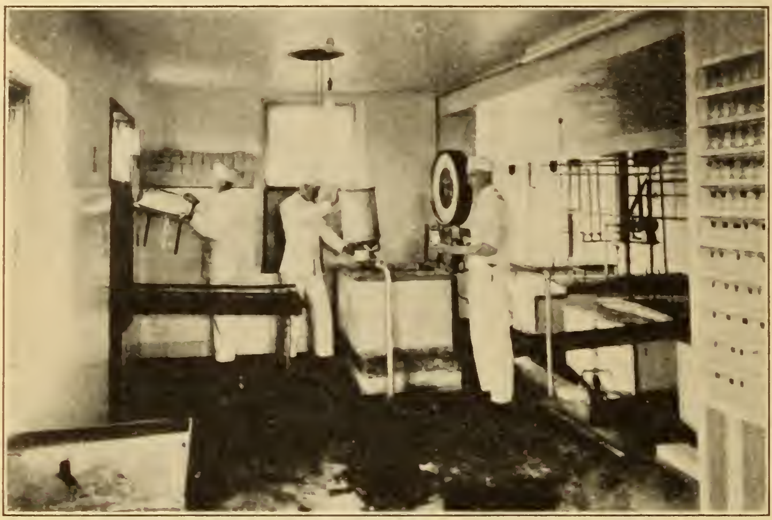

FIG. 1.—The receiving room of a large creamery. The employees are properly clothed for handling cream and butter

The minimum floor space required for a creamery with a capacity of 100,000 to 200,000 pounds of butter a year is about 40 feet square. The ceiling in the main work room should be at least 12 feet high. The floor should be of cement or tile, with a smooth hard surface, and sloping one-fourth inch to the foot to several properly placed drains. The windows should be large and numerous to provide an abundance of light. Several ventilating flues are necessary so that steam and moist air may be removed quickly. In a cold climate a heating system is also essential. A combination heating and ventilating system is advantageous during cold weather.

As to plans for small creameries, some of the State colleges of agriculture furnish them for typical creameries, and it may be that the college of your own State can be of service to you in this connection; or, plans of typical creameries, approved by the Bureau of Dairy Industry, may be obtained from the Division of Agricultural Engineering, Bureau of Public Roads, Department of Agriculture, Washington, D. C., a list of which will be sent free upon request.

FIG. 2.—A creamery may be made one of the beauty spots of the town

LIST OF NECESSARY EQUIPMENT

The following is a list of equipment, costing approximately $10,000, needed for a creamery making 20,000 pounds of butter a month:[3]

One combined churn and butter worker, capacity 1,000 pounds of butter.
One pasteurizing vat, capacity 300 gallons, equipped with recording thermometer.
One starter can, capacity 30 gallons (not needed if sweet-cream butter is made).
One sanitary buttermilk pump with sanitary pipes and fittings.
One machine for washing, sterilizing, and drying cans.
One sanitary cream pump with sanitary pipes and fittings.
Two platform scales with set of test weights.
One weigh can.
One cream conductor.
One can rinser.
One tub and box paraffiner (if butter is packed in tubs or boxes).
One butter printer with extra boxes and table.
One tank for water, capacity 9 barrels.
One tank for buttermilk, capacity 7 barrels.
One cream strainer for weigh can.
One cream strainer for pasteurizer.
One cream strainer for churn.
One buttermilk strainer for churn.
One large, round butter packer (if butter is packed in tubs).
Two factory butter ladles.
Two heavily tinned pails, capacity of each, 14 quarts.
One hand truck.
One hundred and forty-four 2-ounce aluminum-top sample jars.
Three cream-stirring rods and samplers.
One 24-bottle Babcock steam tester.
Seventy-two 9-gram, 50 per cent, 6-inch cream-test bottles (State or Government standard).
Twelve 8 per cent milk-test bottles.
Six skim-milk test bottles, double bore, five-tenths per cent.
Six 9-cubic centimeter cream pipettes.
Six 17.6-cubic centimeter milk pipettes.
Three 17.6-cubic centimeter acid dippers.
Two 8-ounce graduates.
One water bath for test bottles.
Six floating thermometers.
One cream-test scales.
One moisture-test scale.
One scale for weighing one-fourth and 1 pound prints.
One moisture test, consisting of an aluminum cup, 200 cubic centimeters capacity.
One cup lifter, and one alcohol lamp.
One salt test.
One acidity test.
Six sample-jar brushes.
Six cream-can brushes.

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[3] No provision is made for handling milk except that used for culture.

Three floor brushes.
Six Babcock test-bottle brushes.
Two wash sinks equipped with noiseless heaters.
One 30-horsepower boiler with fittings and accessories.
One 15-horsepower engine with fittings and accessories.[4]
One 6 to 10 ton mechanical refrigeration plant with belt-driven compressor.
One exhaust steam water heater.
One boiler feed water pump.
One heating and ventilating equipment.
Shafting, pulleys, belting, pipe, pipe fittings, valves, steam hose, etc.
Tools — wrenches, hammers, screw drivers, etc.
A well, equipped with a good pump, is usually desirable.
Office equipment.

This list includes a mechanical refrigeration plant. Mechanical refrigeration is so far superior to the use of ice that it is being generally adopted even in the Northern States where natural ice may be had merely for the cost of harvesting and storing it. When it is desirable to keep the investment to the minimum, as, for instance, in starting a creamery in a new territory, it may be well to consider the use of ice for refrigeration at least as a temporary expedient. The main objections to ice are the labor of handling it and its inability to reduce the temperature of the refrigerator sufficiently low.

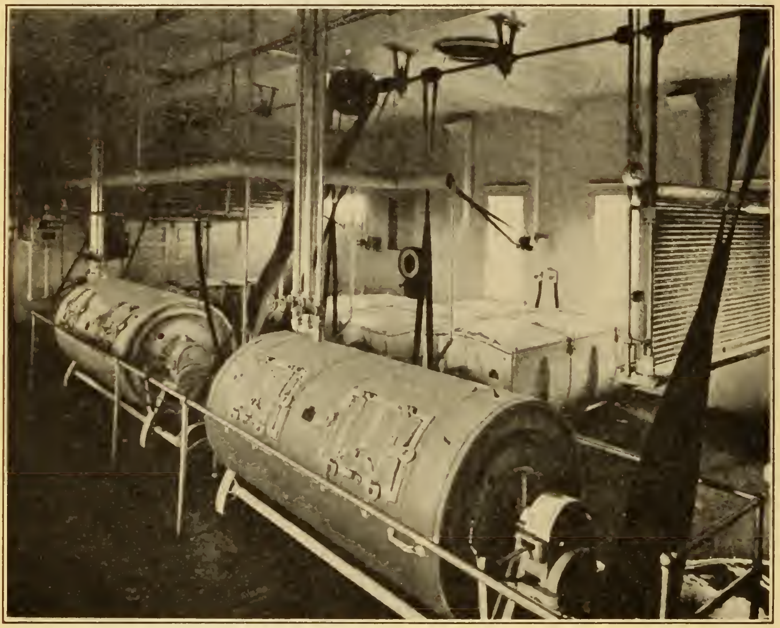

FIG. 3.—The interior of a modern, sanitary creamery

Another piece of equipment that sometimes is not provided when starting a small creamery is the can sterilizing and drying machine. A steam jet and hot-air jet, which take little space, can be provided at very low cost and will do effective work if properly used. Space should be provided, however, for the larger machine since the returning of clean, dry cans to the patrons is an important factor in obtaining high-quality cream.

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[4] If electricity is satisfactory in price and service continuous motors may be used instead of a steam engine.

SOME LEGAL REQUIREMENTS MUST BE COMPLIED WITH

There are various Federal, State, and municipal laws and regulations governing the organization and operation of a creamery. Corporations are required to obtain a State charter; cooperative organizations may or may not operate under a special charter. Municipal regulations may govern the location of a building, the type of construction, electrical installation, etc. In many States creameries, like all other factories, are required to meet certain requirements pertaining to such factors as the operation of boilers and engines, avoidance of fire hazards, safety devices for the protection of employees and employees' liability insurance. A few States require all creameries to operate under a special license. Nearly all States have laws pertaining to sanitation in creameries and dairies; many of them require operators of the Babcock test to be licensed; a few require that the test samples be retained in the plant for a certain length of time so that an inspector may check up on the testing. A Federal law states that all butter shipped in interstate commerce shall contain at least 80 per cent butterfat. Many States have laws governing the butterfat and moisture content of butter manufactured and sold within their jurisdiction. A Federal law requires that butter, like other food products, when shipped in interstate commerce in package form, shall be properly branded and that the weight of the contents be plainly marked on the package.

In planning to establish a creamery, knowledge of all such laws and regulations should be obtained in order that the organization and operation of the creamery may be legal.

The State dairy commissioner or other officials charged with the enforcement of the State dairy laws should be consulted in regard to the legal requirements. In some States this official is active in assisting in the establishment of creameries. The dairy authorities at the State agricultural college have an intimate knowledge of dairy conditions in the State and are therefore in a position to give sound advice in regard to the advisability of establishing a creamery and often can be of great assistance in getting a creamery started.

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